PHIFER WIRE PRODUCTS, INC.
P. O. BOX 1700 • TUSCALOOSA, ALABAMA 35403-1700 U.S.A.

■ CHARLES E. MORGAN
Executive Vice President and Corporate Counsel

November 25, 1996

Ms. Judith Hayes
Compliance Officer
U.S. Consumer Product Safety Commission
4330 East West Highway, Room 613
Bethesda, MD 20814-4408

RECEIVED
CPSC COMPLIANCE
'96 DEC -2 A10:29

Re: CPSC CA930075
Phifer Wire Products, Inc.
Polymer (PVC) Coated Fiberglass Screening

Dear Ms. Hayes:

As I mentioned to you in our last telephone conversation, Phifer Wire has recently had comprehensive emissions testing and analysis performed by Air Quality Sciences, Inc. on a sample of our current production fiberglass screening. They tested a recently manufactured nine square foot sample of our screening that had never been exposed to direct sunlight - exactly like the sample I sent to you with my October 30, 1996 letter. Enclosed is a complete copy of the Air Quality Sciences report on the results of that testing. The document is titled "INDOOR AIR QUALITY EVALUATION OF NEW VINYL COATED FIBERGLASS WINDOW SCREENING" and is dated November 19, 1996.

The results of the recently completed tests are consistent with the results of previous testing of our products in that they show no emissions of any substances in concentrations that could be considered toxic or potentially harmful to human beings. The enclosed report represents the most comprehensive testing and analysis of our product ever completed. The results of the tests were used to predict air concentrations of the various chemicals identified using models based upon average sized homes with average numbers of windows. The concentrations determined through the testing were compared with guidelines and specifications published by the American Congress of Governmental Industrial Hygienics, permissible exposure limits (PEL) from the Occupational Safety and Health Administration (OSHA), a German government regulation for maximum allowable workplace concentrations (MAK), and specifications from the State of Washington Indoor Air Quality Program. In all cases, emissions of TVOCs, formaldehyde and particles from our product were far below permissible levels set out in the various guidelines, specifications and regulations.

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We included the comparison with the German government regulations because we sell a lot of this product in Europe, especially in Germany. We included the comparison with the State of Washington specifications because that Indoor Air Quality Program is considered the most progressive, comprehensive and strictest set of guidelines specifying acceptable levels of product emissions from building materials. Our consultant tells me that the program developed in the State of Washington is now being copied by several other states and will likely be copied by the U.S. Environmental Protection Agency as it develops its standards for indoor air quality. For a product to be acceptable for use in any government building in the State of Washington, the product must fall below the TVOC, formaldehyde and particles specifications within five days of exposure. As the enclosed report indicates, the sample of our current production material emitted far less TVOCs, formaldehyde and particles than the Washington specifications within just four hours of exposure and throughout the 96-hour testing period.

Please note that these tests were conducted at higher temperatures than in the previous Air Quality Sciences test - approximately 70° Celsius, which is the equivalent of 158° F. Heating the product to such high temperature will undoubtedly drive off more chemicals than would be emitted under normal household conditions.

I hope the enclosed data will help you in evaluating the safeness of our product. If you ever need additional information, please feel free to contact me at any time.

Sincerely yours,

PHIFER WIRE PRODUCTS, INC.

Charles Morgan

Charles Morgan

CM:jh

Enclosure

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INDOOR AIR QUALITY EVALUATION OF A NEW VINYL COATED FIBERGLASS WINDOW SCREENING

prepared for

PHIFER WIRE PRODUCTS, INC.

Released by Air Quality Sciences, Inc.
AQS Report No. 02792-02
November 19, 1996

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EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Air Quality Sciences, Inc. (AQS) is pleased to present the results of its indoor air evaluation of a screen sample identified as "New Vinyl Coated Fiberglass Window Screening" for Phifer Wire Products, Inc. AQS conducted this study using a product evaluation test protocol following the requirements of ASTM Standard D 5116 and the State of Washington's IAQ Specification of January, 1994 (1,2). Testing of the screen was conducted using elevated environmental chamber operating conditions as presented in Table 1.

The sample was monitored for emissions of total volatile organic compounds (TVOC), formaldehyde (HCHO), other individual volatile organic compounds (VOCs), and particles over a 96 hour exposure period. These emissions were measured, and resultant air concentrations were determined for each of the potential pollutants. Air concentration predictions were computer modeled based on product use parameters provided by the customer. Results were compared with the State of Washington specifications, occupational exposure levels, and various regulatory lists.

RESULTS

Emission factors were measured over a 96 hour exposure period for formaldehyde, TVOC, and particles. These data and predicted air concentrations are given in Tables 2-4. Detected individual volatile organic compounds (VOCs) are listed in Table 5. This product met the State of Washington specification for TVOC, formaldehyde, and particles within 4 hours of exposure.

Air concentrations were predicted to range from 401 $\mu g/m^3$ to 6 $\mu g/m^3$ for TVOC; this concentration fell below the 500 $\mu g/m^3$ TVOC specification within 4 hours of being installed in the chamber. The TVOC emission profile is presented in Figure 1. Maximum and minimum contaminant levels are compared to the State of Washington requirements in Table 6. Acceptable contamination levels were met within the required 5 day period.

Those chemicals found on certain regulatory lists are shown in Table 7. It must be noted that these regulatory lists only provide a statement regarding possible health effects associated with these compounds, and do not provide information on the relative risks of exposure. Proper interpretation of the risks associated with exposure to a given regulated compound requires a more detailed evaluation of toxicological activity.

Individual compounds identified in the test sample emissions were compared to occupational levels, including threshold limit values (TLV) from American Congress of Governmental Industrial Hygientics (ACGIH), permissible exposure limits (PEL) from the Occupational Safety and Health Administration (OSHA), and Federal Republic of Germany Maximum Concentration Values in the Workplace (MAKs). Those compounds identified on these lists are compared to the exposure levels in Table 8, along with the maximum predicted exposure concentration from the measured emissions data and the parameters provided by the customer. None of the occupational levels would be predicted to be exceeded under these conditions. Table 9 shows the predicted concentrations over 96 hours for these contaminants.

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PRODUCT EVALUATION METHODOLOGIES

ENVIRONMENTAL CHAMBER

The screen was tested in an environmental chamber and chemical emissions were analytically measured. Environmental chamber operation and control measures used in this study complied with ASTM D 5116 (1). The chamber used is manufactured from stainless steel, and its interior is polished to a mirror-like finish to minimize contaminant adsorption. Air flow through the chamber enters and exits through an aerodynamically designed air distribution manifold also manufactured of stainless steel. Supply air to the chamber is stripped of formaldehyde, VOCs, and other contaminants, so that any contaminant backgrounds present in the empty chamber fall below strict specifications (< 2 $\mu g/m^3$ TVOC, < 10 $\mu g/m^3$ total particles, < 6 $\mu g/m^3$ formaldehyde). AQS chambers are process controlled and are equipped with a continuous data acquisition system for verification of the operating conditions of air flow, temperature, and humidity.

Air supply to the chamber was maintained at a temperature of 70°C ± 2°C and relative humidity at 5% ± 3%. The air exchange rate was 1 air change/hour (ACH). Environmental chamber study parameters are presented in Table 1.

ANALYTICAL MEASUREMENTS

Formaldehyde

Formaldehyde emissions were determined using EPA Method IP-6A. Waters DNPH-Silica Sep Pak cartridges (Part number 37500, Millipore Corp.) were used to determine the concentrations of formaldehyde and other low-molecular weight carbonyl compounds in chamber air. The 2,4-dinitrophenylhydrazine (DNPH) reagent in the cartridge reacted with carbonyl compounds to form the stable hydrazone derivatives retained by the cartridge. These cartridges meet the requirements of U.S. EPA Methods TO-11 and IP-6A.

The hydrazone derivatives were eluted from a cartridge with HPLC-grade acetonitrile. An aliquot of the sample was analyzed for low-molecular weight aldehyde hydrazone derivatives using reverse-phase high-performance liquid chromatography (HPLC) with UV detection. The absorbances of the derivatives were measured at 360 nm. The mass responses of the resulting peaks were determined using multi-point calibration curves prepared from standard solutions of the hydrazone derivatives (3).

Volatile Organic Compounds

VOC measurements were made using gas chromatography with mass spectrometric detection (GC/MS). Chamber air was collected onto a solid sorbent which was then thermally desorbed into the GC/MS. Instrumentation included a NuTech 8533 Universal Sample Concentrator, a Hewlett-Packard 5890 Series II Gas Chromatograph and a Hewlett-Packard 5970 or 5971 Mass Selective Detector (GC/MS). The solid sorbent collection media contained Carbosieve SIII, Carbotrap 20/40 Mesh, and Carbotrap C.

The multi-bed collection technique, separation, and detection analysis methodology has been adapted from techniques presented by the U.S. EPA and other researchers. The technique follows EPA Method IP-1B and is generally applicable to C_4 - C_{16} organic chemicals with boiling points ranging from 35°C to 250°C (3-6). It has a detection limit of 0.9 $\mu g/m^3$ for most individual VOCs and total volatile organic compounds (TVOC).

Individual VOCs were separated and detected by GC/MS. The TVOC measurements were made by adding all individual VOC responses obtained by the mass spectrometer and calibrating the total mass relative to toluene. Individual VOCs, if analyzed, were quantified (relative to toluene as a standard) and identified using AQS' specialized indoor air mass spectral database. Other compounds were identified with less certainty using a general mass spectral library available from the National Institute of Standards and Technology (NIST). This library contains mass spectral characteristics of over 75,000 compounds as made available from NIST, the Environmental Protection Agency (EPA) and the National Institutes of Health (NIH). A match is first sought in the AQS database, which includes data for the gas chromatographic retention time of the compound in addition to the mass spectrum. This additional information, along with the use of spectra generated on AQS equipment, makes confidence in identifications made from the AQS database higher than in identifications made using only the NIST/EPA/NIH mass spectral library.

Particles

Particle measurements were made micro-gravimetrically utilizing AQS method AN001. This technique is comparable to the NIOSH Method 0500 (7), and has a detection limit of 10 $\mu g/m^3$, based on an air collection volume of 1000 L.

AIR CONCENTRATION DETERMINATIONS

Emission rates of formaldehyde and TVOC were used in a computer exposure model to determine potential air concentrations of the pollutants. The computer model utilized the measured emission rate changes over the one week time period to determine the change in air concentrations that would accordingly occur (8).

The model measurements were made with the following assumptions: air within the open areas of the building is well-mixed at the breathing level zone of the occupied space; environmental conditions are maintained at 50% relative humidity and 23°C (73°F); there are no additional

sources of these pollutants; and there are no sinks or potential re-emitting sources within the space for these pollutants.

QUALITY CONTROL PROCEDURES FOR ENVIRONMENTAL CHAMBER EVALUATIONS

Air Quality Sciences' quality control/assurance plan is designed to ensure the integrity of the measured and reported data obtained during its product evaluation studies. This QC program encompasses all facets of the measurement program from sample receipt to final review and issuance of reports.

One of the most critical parameters in AQS' product evaluations is the measurement of ultratrace levels of gaseous chemicals, typically in the ppb air concentration range. This necessitates a very rigidly maintained effort to control background contributions and contamination. These contributions must be significantly less than those levels being measured for statistically significant data to be obtained. AQS addresses this control in many directions including chamber construction materials, air purification and humidification, sampling materials and chemicals, sample introduction, and analysis.

Supply air purity is monitored on a weekly basis, using identical methodology to the chamber testing. The supply air is assured to contain less than 2.0 $\mu g/m^3$ TVOC, < 10 $\mu g/m^3$ total particles, and < 6 $\mu g/m^3$ formaldehyde. Preventative maintenance ensures supply air purity, and corrective action is taken when any potential problems are noted in weekly samples. Supply air filter maintenance is critical for ensuring the purity of the chamber supply air. Chamber background samples are obtained prior to product exposure to ensure contaminant backgrounds meet the required specifications prior to product exposure. Results of this monitoring are maintained at AQS and available for on-site inspection.

All environmental chamber procedures are in accordance with ASTM D 5116 and meet the data quality objectives required.

Various measures are routinely implemented in a product's evaluation program. These include but are not limited to:

appropriate record keeping of sample identifications and tracking throughout the study;

calibration of all instrumentation and equipment used in the collection and analysis of samples;

tracking of all chamber parameters including air purification, environmental controls, air change rate, chamber mixing, air velocities, and sample recovery;

analysis of spiked samples for accuracy determinations;

duplicate analyses of 10% of all samples evaluated and analyzed;

multi-point calibration and linear regression of all standardization;

analysis of controls including chamber backgrounds, sampling media, and instrumental systems.

Precision of TVOC analyses is assessed by the relative mean deviation (%RMD) from duplicate samples, defined as the absolute value of the difference between the mean and either test value, divided by the mean. Accuracy is based on recovery of toluene mass spiked onto sorbent material. QC data on TVOC measurements conducted for the calendar year ending October 31, 1996, showed an average precision measurement of 23.0% RMD based on duplicate measurements and 98% accuracy based on toluene spikes. Performance audits have been conducted on-site at AQS by the U.S. Environmental Protection Agency for several industry test programs. They are favorable and are open for review at AQS.

Quality assurance is maintained through AQS' computerized data management system (ADM). An electronic "paper trail" for each analysis is also maintained and utilized to track the status of each sample, and to store the results.

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TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS FOR PHIFER WIRE PRODUCTS, INC.

PRODUCT 02792-020AA

Product Description:	New Vinyl Coated Fiberglass Window Screening
Environmental Chamber:	SC2
Product Loading:	1.00 m^2/m^3
Test Conditions:	1.00 ACH 5.0% RH ± 3.0% RH 70.0° C ± 2.0° C
Test Period:	11/05/96 - 11/09/96
Pollutant Emissions Evaluated:	Total Volatile Organic Compounds Individual Volatile Organic Compounds Formaldehyde Particles
Test Description:	The product was received by AQS as packaged and shipped by the customer on October 12, 1996. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Just prior to loading, the product was unpackaged and weighed. The sample was cut to the specified size and loaded into the environmental chamber on x-supports to expose both sides, and tested according to the specified protocol.

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TABLE 2

SUMMARY OF FORMALDEHYDE EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

ELAPSED EXPOSURE HOUR*	EMISSION FACTOR $\mu g/m^2 \cdot hr$	PREDICTED AIR CONCENTRATION**	
		$\mu g/m^3$	ppb
4.000	1.0	0.1	0.08
8.000	nd	0.1	0.08
24.000	nd	< 0.1	< 0.08
48.000	nd	< 0.1	< 0.08
72.000	nd	< 0.1	< 0.08
96.000	nd	< 0.1	< 0.08

*Exposure hours are nominal (± 1 hour).
**Based on 0.055 m^2/m^3 loading and 0.35 ACH, as specified by customer.
"nd" denotes non-detectable (< 0.5 $\mu g/m^2 \cdot hr$ for formaldehyde).

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TABLE 3

SUMMARY OF TVOC EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

ELAPSED EXPOSURE HOUR*	EMISSION FACTOR $\mu g/m^2 \cdot hr$	PREDICTED AIR CONCENTRATION $\mu g/m^{3**}$
4.000	3243.2	401
8.000	2712.5	431
24.000	1300.7	216
48.000	254.1	67
72.000	190.5	20
96.000	121.4	6

*Exposure hours are nominal (± 1 hour).
**Based on 0.055 m^2/m^3 loading and 0.35 ACH, as specified by customer.

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TABLE 4

SUMMARY OF PARTICLE EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

ELAPSED EXPOSURE HOUR*	EMISSION FACTOR $\mu g/m^2 \cdot hr$	PREDICTED AIR CONCENTRATION $\mu g/m^{3**}$
4.000	nd	< 1
8.000	nd	< 1
24.000	nd	< 1
48.000	nd	< 1
72.000	nd	< 1
96.000	nd	< 1

*Exposure hours are nominal (± 1 hour).
**Based on 0.055 m^2/m^3 loading and 0.35 ACH, as specified by customer.
"nd" denotes non-detectable (< 50 $\mu g/m^2 \cdot hr$ for Particles).

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TABLE 5

EMISSION FACTORS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS
$\mu g/m^2 \cdot hr$

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

COMPOUND IDENTIFIED	ELAPSED EXPOSURE HOUR		
	4.0	24.0	96.0
1(2H)-Naphthalenone, 3,4-dihydro-3-methyl-*	4.2		
1(2H)-Naphthalenone, 7-(1,1-dimethylethyl)-3,4-dihydro-*	10.7		
1(2H)-Pyrazineacetonitrile, 5-amino-3,6-dihydro-3-imino-*	18.5	4.1	
1(3H)-Isobenzofuranone*	4.0		
1,1'-Biphenyl, 2,2'-diethyl*	9.5	24.9	
1,1'-Biphenyl, 2-methyl*		2.5	
1,1'-Biphenyl, 4-methyl*		3.0	
1,2,3-Propanetriol, triacetate (Triacetin)*	18.8	1.2	
1-Decanol (N-Decyl alcohol)	5.8		
1-Dodecanethiol*	9.4		
1-Dodecanol	479.8	155.4	
1-Heptanol, 6-methyl*	3.5	2.5	
1-Hexadecanol*		6.9	9.3
1-Hexanol, 2,2-dimethyl-*	1.8	1.1	0.7
1-Hexanol, 2-ethyl	147.1	94.4	29.8
1-Nonanol	6.2		
1-Octanol, 3,7-dimethyl	13.4	12.7	1.6
1-Tetradecanol	56.8	110.4	4.2
1-Tridecanol		25.6	

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COMPOUND IDENTIFIED	ELAPSED EXPOSURE HOUR		
	4.0	24.0	96.0
1-Undecanol*	28.0		
1H-Inden-1-one, 2,3-dihydro-3,3,5,7-tetramethyl-*	9.5		
1H-Pyrazole, 4,5-dihydro-3-methyl-*	23.2	5.8	
2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate (Texanol)	55.7		
2,2-Dimethyl-1-isopropyl-1,3-propanediol monoisobutyrate (Texanol)	28.4		
2,6-Di-tert-butyl-4-methylphenol (BHT)	20.4		
2-Nonylphenol*		5.2	
2-Propanol, 1-ethoxy (8Cl9Cl)*	21.8	5.6	
2-Propenoic acid, octyl ester*	7.2		
3-Cyclohexene-1-methanol, α,α,4-trimethyl*	9.7		
3-Phenyl-4-hydroxyacetophenone*	5.6		
4-Nonylphenol*		9.7	6.3
5-Methyl-1-heptanol*	2.9	1.9	
Acetic acid	54.6	9.9	0.7
Benzene, (1-propyloctyl)*		7.2	
Benzene, 1,1'-(1,1,3,3-tetramethyl-1,3-propanediyl)bis-*	10.9		
Benzene, 1,3,5-tris(1-methylethyl)-*	52.5		
Butanoic acid	1.4		
Cyclohexane, 2-butyl-1,1,3-trimethyl*	8.0		
Decahydro-4,4,8,9,10-pentamethylnaphthalene*	15.7		
Dibutyl maleate*		5.1	
Dipropylene glycol	8.4	3.0	
Dodecane	15.4	1.8	
Dodecane, 1-chloro*			2.7
Ethanol, 2-(2-butoxyethoxy)	11.0		

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COMPOUND IDENTIFIED	ELAPSED EXPOSURE HOUR		
	4.0	24.0	96.0
Ethanol, 2-phenoxy	3.6		
Ethanone, 1-(7-hydroxy-5-methoxy-2,2-dimethyl-2H-1-benzopyran-8-yl)*	241.5	107.4	
Formamide, N,N-bis(2-cyanoethyl)-*		8.5	
Heptane, 3-methylene (9CI)*	0.7	0.9	0.5
Heptanoic acid	1.3		
Hexadecane (Cetane)	26.5		
Hexadecane, 3-methyl*	7.6		
Hexanal	1.5		
Hexanedioic acid, bis(1-methylethyl) ester (9CI)*	28.5	2.0	
Hexanoic acid, 2-ethyl	1033.5	294.7	3.8
Mephentoin*	7.3		
N-Methyl-N-propyl-propylamine*	2.0		
Naphthalene	8.1		
Naphthalene, 1,2,3,4-tetrahydro-1,1,6-trimethyl-*	11.6		
Naphthalene, 1,2,3,4-tetrahydro-1,5,8-trimethyl-*	8.6		
Naphthalene, 1,2,3,4-tetrahydro-5,7-dimethyl-*	6.1		
Naphthalene, 1,2,3,4-tetrahydro-6,7-dimethyl*	11.6		
Naphthalene, 1,2,3,4-tetrahydro-6-methyl*	1.4		
Naphthalene, 1-methyl	4.8		
Naphthalene, 2,6-dimethyl*	4.6		
Naphthalene, 6,7-diethyl-1,2,3,4-tetrahydro-1,1,4,4-tetramethyl*	30.6		
Nonanoic acid, ethyl ester*		2.4	
Octadecane		7.0	
Octanal, 7-hydroxy-3,7-dimethyl*	10.2		

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COMPOUND IDENTIFIED	ELAPSED EXPOSURE HOUR		
	4.0	24.0	96.0
Octanethioic acid, S-ethyl ester*	24.6		
Octanethioic acid, S-methyl ester*		13.4	
Pentadecane	26.0		
Phenol	331.1	206.7	56.7
Phenol, 4-(1-methyl-1-phenylethyl)-*	2.7	32.7	
Phenol, 4-t-butyl (4-(1,1-Dimethylethyl)phenol)	7.5		
Phenol, nonyl-*	8.2	17.9	4.1
Phosphonic acid, diethyl ester*		3.4	
Phthalate, diethyl (1,2-Benzenedicarboxylic acid, diethyl ester)	17.5	6.5	
Propanoic acid	2.6		
TXIB (2,2,4-Trimethyl-1,3-pentanediol diisobutyrate)	72.0	71.7	
Tetradecane	9.0		
Toluene (Methylbenzene)	1.5	1.4	0.7
Unidentified	66.5	20.4	
α-Isomethyl ionone*	22.2		
ε-Caprolactam (2H-Azepin-2-one, hexahydro)	19.8	3.4	

*Indicates NIST/EPA/NIH best library match only.
Individual volatile organic compounds are calibrated relative to toluene.

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TABLE 6

SUMMARY DATA
STATE OF WASHINGTON COMPLIANCE

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

POLLUTANT CONCENTRATIONS*

	Formaldehyde (HCHO) µg/m^3	Total Volatile Organics (TVOC) µg/m^3	Particles µg/m^3
State of Washington Specification	61 (50 ppb)	500	50
Maximum Concentration	0.1 (0.08 ppb)	401	< 1
Minimum Concentration	< 0.1 (< 0.08 ppb)	6	< 1

*Pollutant concentrations determined from Indoor Air Model Exposure Version 2.0, U.S.Environmental Protection Agency, coupled with emissions data from AQS.

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TABLE 7

REGULATORY OR GUIDANCE CHEMICAL LISTS

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

COMPOUND	✓() = FOUND IN LISTING (CLASS)			
	CAL AIR TOXICS	CAL PROP. 65	NTP	IARC
2,6-Di-tert-butyl-4-methylphenol (BHT)				✓(3)
Formaldehyde	✓(r)	✓	✓(2)	✓(2A)
Phenol				✓(3)
Toluene (Methylbenzene)		✓		✓(3)
ε-Caprolactam (2H-Azepin-2-one, hexahydro)				✓(4)

CAL Air Toxics: California Air Resources Board, Toxic Air Contaminants
r = under review

CAL Prop. 65: California Health and Welfare Agency, Proposition 65 Chemicals
1 = known to cause cancer
2 = known to cause reproductive toxicity

NTP: National Toxicology Program
1 = known to be carcinogenic
2 = anticipated to be carcinogenic

IARC: International Agency for Research on Cancer
1A = carcinogenic to humans
2A = probably carcinogenic to humans
2B = possibly carcinogenic to humans
3 = unclassifiable as to carcinogenicity to humans
4 = probably not carcinogenic to humans

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TABLE 8

THRESHOLD LIMIT VALUES FOR OCCUPATIONAL EXPOSURES

PRODUCT 02792-010AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

CAS NUMBER	COMPOUND IDENTIFIED	MAXIMUM PREDICTED CONCENTRATION (mg/m^3)	DFG MAK (mg/m^3)		ACGIH TLV (mg/m^3)		OSHA PEL† (mg/m^3)	
			TWA	PEAK	TWA	STEL**	TWA	STEL
92-52-4	1,1'-Biphenyl (9CI)	0.001	1		1.3		1	
123-51-3	1-Butanol, 3-methyl	< 0.001	360	720	361	452	360	450
64-19-7	Acetic acid	0.007	25	50	25	37	25	
112-34-5	Ethanol, 2-(2-butoxyethoxy)	0.001	100	200				
91-20-3	Naphthalene	0.001	50		52	79	50	75
108-95-2	Phenol‡	0.037	19	38	19		19	
98-54-4	Phenol, 4-t-butyl	0.001	0.5	2.5				
79-09-4	Propanoic acid	< 0.001	30	60	30		30	
108-88-3	Toluene	< 0.001	190	950	188		375	560

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CAS NUMBER	COMPOUND IDENTIFIED	MAXIMUM PREDICTED CONCENTRATION (mg/m^3)	DFG MAK (mg/m^3)		ACGIH TLV (mg/m^3)		OSHA PEL† (mg/m^3)	
			TWA	PEAK	TWA	STEL**	TWA	STEL
105-60-2	ε-Caprolactam	0.003	23		23	46	20	40
50-00-0	Formaldehyde	< 0.001	0.5	1.2		C 0.37	0.9	2.5

Key:
DFG = Federal Republic of Germany
MAK = Maximum Concentration Values in the Workplace (Germany)
TWA = Time Weighted Average
ACGIH = American Conference of Governmental Industrial Hygienists
OSHA = Occupational Safety and Health Administration
TLV = Threshold Limit Value
STEL = Short-term Exposure Limit

**Values preceded by the letter "C" indicate ceiling levels, indicating concentrations which should not be exceeded.
†Skin may be significant route of exposure.
Numbers in parentheses represent levels which have proposed changes.

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TABLE 9

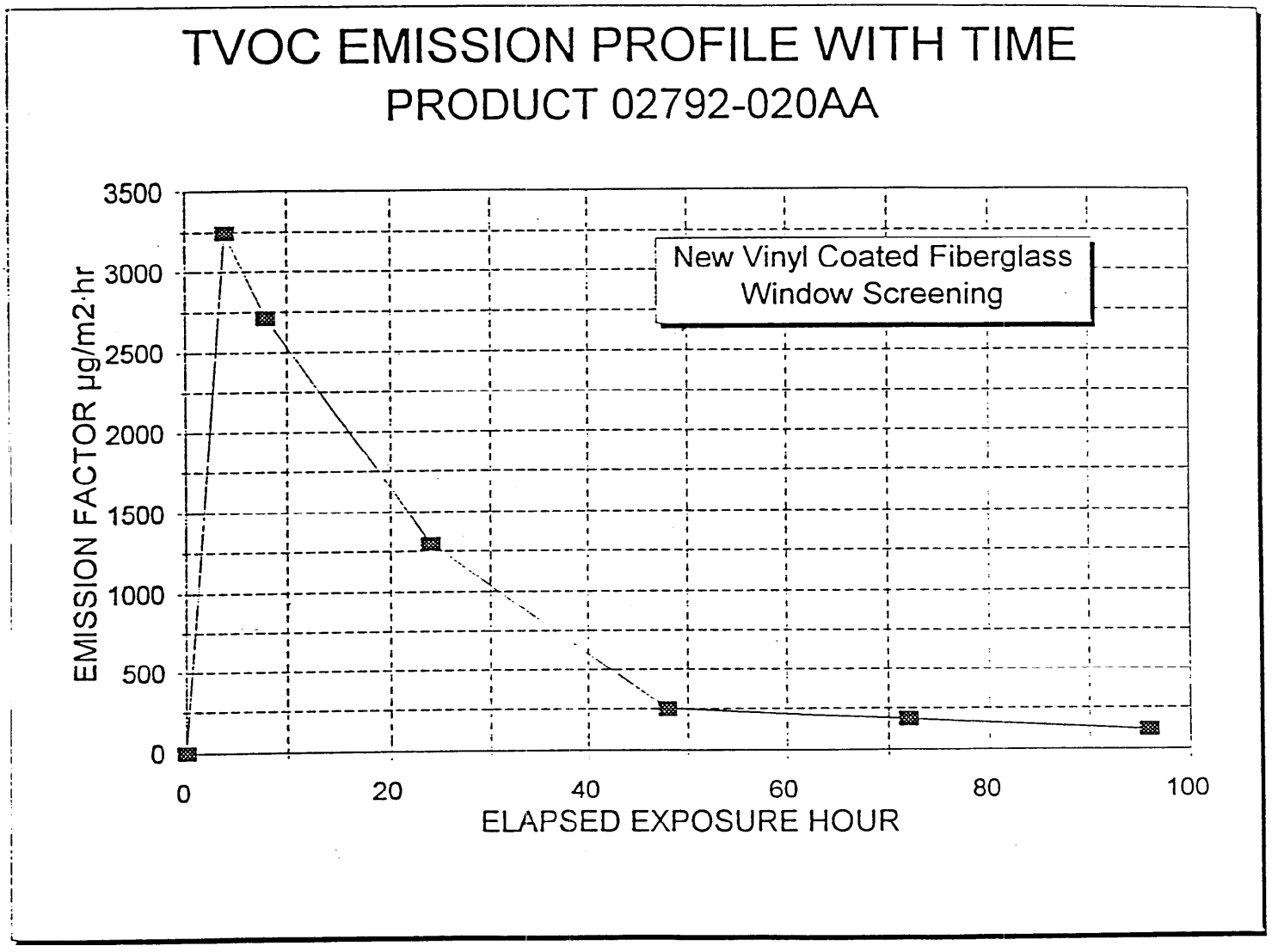
PREDICTED CONCENTRATIONS OVER 96 HOURS FOR CONTAMINANTS WITH MAK VALUES

PRODUCT 02792-020AA, NEW VINYL COATED FIBERGLASS WINDOW SCREENING

COMPOUND	PREDICTED CONCENTRATION ($\mu g/m^3$)					
	4 HRS	8 HRS	24 HRS	48 HRS	72 HRS	96 HRS
1,1'-Biphenyl (9Cl)	0.5	0.5	0.1	< 0.1	< 0.1	< 0.1
1-Butanol, 3-methyl	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Acetic acid	6.8	6.4	1.8	0.2	< 0.1	< 0.1
Ethanol, 2-(2-butoxyethoxy)	1.5	1.3	0.3	< 0.1	< 0.1	< 0.1
Naphthalene	1.1	1.0	0.2	< 0.1	< 0.1	< 0.1
Phenol	37.5	43.4	33.7	20.3	12.2	7.3
Phenol, 4-t-butyl	1.0	0.9	0.2	< 0.1	< 0.1	< 0.1
Propanoic acid	0.3	0.3	0.1	< 0.1	< 0.1	< 0.1
Toluene	0.2	0.2	0.1	< 0.1	< 0.1	< 0.1
ε-Caprolactam	2.6	2.4	0.5	< 0.1	< 0.1	< 0.1
Formaldehyde	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1

Released by Air Quality Sciences, Inc.
Date Prepared: November 19, 1996
AQS Project #: 02792
AQS Report #: 02792-02

FIGURE 1



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